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Conversion Planting on poor hardwood sites shows promise in Ohio

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THE VINTON FURNACE EXP. FOREST
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Forest Service, 111 Old Federal Building, Columbus 15, Ohio
W. G. McGinnies, Director

Conversion Planting on poor hardwood sites shows promise in Ohio

by

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Stunted and defective hardwoods cover many ridgetops in southeastern Ohio. Although these ridges are not good sites even for pine, native pines do occur there and are usually much taller and straighter than the hardwoods. Therefore it seems reasonable that converting these ridgetop stands to pine would be a good way to increase timber production. In 1954 a study was begun on the Vinton Furnace Experimental Forest to test this possibility by clearcutting the hardwoods and planting pine. After the first 5 years, the pines are showing satisfactory survival and growth.

The ridges to which this study applies have shallow surface soil and a fine-textured, plastic subsoil. The trees commonly found here are chestnut oak (*Quercus prinus* L.), black oak (*Q. velutina* Lam.), white oak (*Q. alba* L.), scarlet oak (*Q. coccinea* Muenchh.), post oak (*Q. stellata* var. *stellata*) and several of the hickories (*Carya* sp.). Few of these trees ever grow taller than 50 to 70 feet or larger than 12 to 16 inches in diameter in 90 years. Generally they are low in quality or unmerchantable because of forks and crooks, and low in volume because of small diameters and short boles. Native shortleaf and pitch pines (*Pinus echinata* Mill., *P. rigida* Mill.) that are in the mixture will, in many cases, attain 2-log size in the same time that it takes the associated hardwoods to reach 1/2-, 1-, or 1 1/2-log size.

WHAT WE DID

On three blocks, each consisting of two 1/2-acre plots, the hardwoods were completely clearcut during the fall and winter of 1953, and the plots were planted to a mixture of shortleaf, pitch, and white pine (*P. strobus* L.) on a 7- by 7-foot spacing the following spring.

A heavy cover of hardwood sprouts developed on the plots during the first growing season. To determine how this sprout competition affected their growth, the planted pines in half the plots were released in the summer of 1954 by cutting the sprouts from around the pines and spraying the stumps with a herbicide (2,4-D and 2,4,5-T mixed with diesel fuel oil) (fig. 1). Further releases were to be made when judged necessary, a second being made in the summer of 1956.

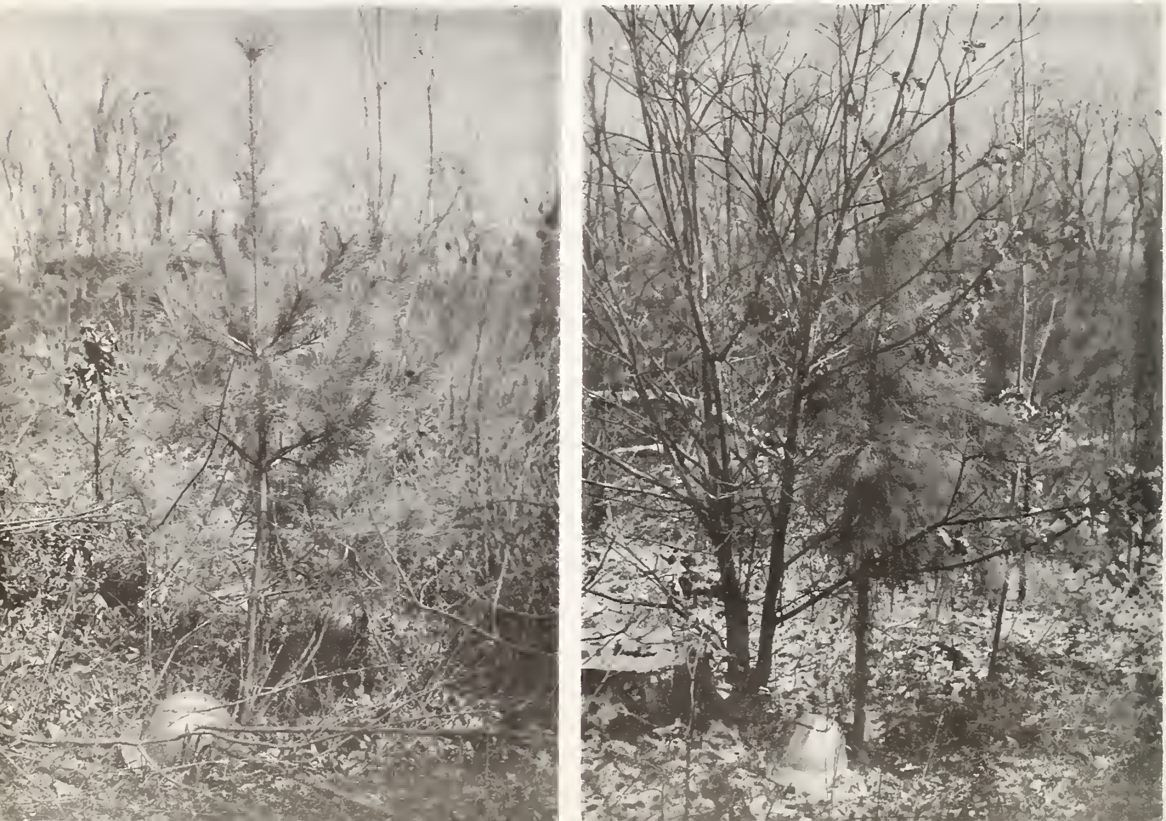

Figure 1.--(Left) Released white pine 5 years after planting. Release consisted of cutting the sprouts almost through, bending them over, and applying a herbicide. (Right) An unreleased shortleaf pine in need of release 5 years after planting.

WHAT WE FOUND

Although white pine survived best, survival on all plots is adequate: 80 percent on the released plots (690 trees per acre), and 71 percent on the non-released plots (600 trees per acre) (fig. 2).[1] Pine survived best on the poorest site and poorest on the best site (this difference was significant at the 5-percent level of probability). Apparently, the better the site the more competition the hardwood sprouts offer to the pines. On better sites than those tested, competition from hardwood sprouts might be so great that satisfactory pine survival could not be obtained without release.

On the non-released plots, when only the pines that are taller than the competing sprout canopy (thus classified as being "free to grow") are considered, an interesting trend develops. After 5 years, 43 percent of the living white pine and 71 percent of the living shortleaf and pitch pines are "free to grow" without having had the benefit of a release treatment (fig. 3). These total 357 trees per acre. In 1956, on the other hand (after the third growing season), there were only 238 pines per acre taller than the competing sprout canopy (table 1). Apparently the planted pines are outgrowing the brush and sprout competition.

Table 1.--Trees taller than their competing vegetation on the non-released plots[1]

Species	Year	Number of trees per acre	Average height
		Number	Feet
White pine	1956	60	2.3
	1958	106	4.5
Shortleaf and pitch pines	1956	178	4.0
	1958	251	7.1
Total	1956	238	--
	1958	357	--

[1] Each figure is the mean of three 1/2-acre plots.

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[1] Difference significant at the 1 percent level.

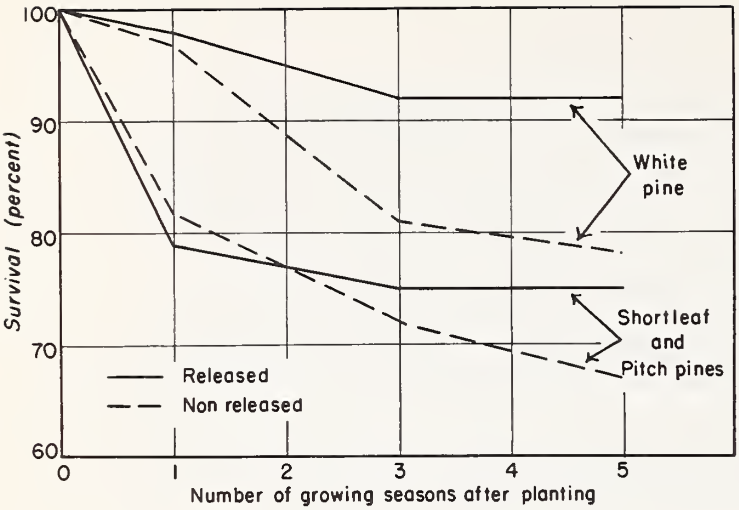


Figure 2.--Survival trends for released and non-released pines.

The average pine on the released plots is taller than the average on the non-released plots (fig. 4). Although this difference in height is significant at the 1 percent level of probability, it may not be important from a practical standpoint for the actual difference is small. Moreover, as more of the pine in the unreleased plots clear the sprout canopy, as they seem to be doing, average height growth on

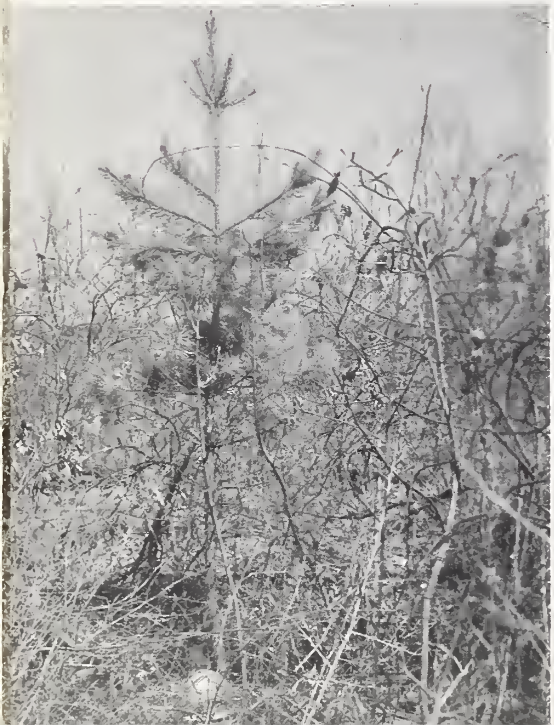
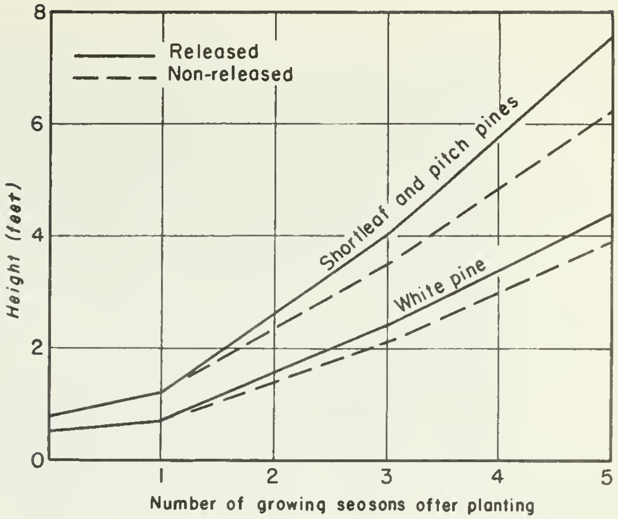


Figure 3.--A fast-growing shortleaf pine that has never been released.

Figure 4.--Height-growth trends for released and non-released pines.



the non-released plots should increase. Thus early release work probably is not justified on these poor sites although it may be necessary to release portions of a plantation to insure a more even distribution of the pines. On better sites, where hardwood competition is more severe, release probably would be required.

It is still too soon to say definitely that the conversion will succeed, but so far the pines have survived well and their growth is such that within 5 years after planting many of them have already overtaken the hardwood sprouts. In fact there are now enough unreleased pines above the sprout canopy to provide a reasonably well-stocked stand in the future, and the number seems to be increasing.